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Malasian Journal of Library and Information Science: An analysis of Author Collaboration

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Abstract

This article presents the analysis of collaboration pattern for the articles published in the journal: Malasian Journal of Library and Information Science during the period 2011-2015. Several indicators of collaboration including authorship pattern, collaboration index, degree of collaboration, and collaboration coefficient has been studied. Average authors per paper, productivity per author, most prolific authors, single authored and multi-authored articles are investigated. During the period of study MJLIS has published 110 articles by 289 authors, out of which 18 single authored, 42 double authored, 33 triple authored, 9 four author, 3 five author and 5 more than 5 authored papers have been contributed. The average degree of collaboration is 0.83, average collaboration index is 2.67, average coefficient of collaboration is 0.51, and average modified collaboration coefficient is 0.53 during the five years 2011-2015. Bibliometrics (43 times) Information literacy(11), Library use (12), Information seeking (10)and Malaysia (8) anr the most used keywords. The most productive institutes are found to be *University of Malaya, Malaysia (60),Nanyang Technological University, Singapore (17), Islamic Azad University, Iran (13)and Universiti Sains Malaysia (12).The top four most prolific authors are A Abrizah with 10 (3.39%) articles, A Zainab with 9 papers, N H Abdul Karim and S A Saani each with five papers. Average authors per paper (AAPP) during the five years are found to be 2.57,2.9, 2.63, 2.25, 2.80 . It was found that there are 38 inter-institute collaborations, 34 are intra institute collaborations and 25 international collaborations.*

Keywords: Collaboration Pattern, Collaboration Index, Degree of Collaboration, Collaboration Coefficient, Co- author Index, Lotka's law and Zipf's law

Introduction

The recent advances in information and technologies have allowed efficient communication at national and international level. This helps to facilitate and maintain the internationalisation of research and studies. Further, the open access publication policy has provided more opportunities to the researchers to access as well as publish their research internationally. Today more than 90% research work and scientific projects in almost all the branches of science, technology, engineering, and mathematical sciences are produced through collaborative research (Bozeman and Corley, 2004). Collaboration can be observed increasingly almost in every branch of research at different levels. Researchers are collaborating at individual level, institutional level, national level, and international level, and it may be based on some theoretical ideas, advice, criticism or technical collaboration (resources, methods etc.) (Heffner, 1981). It is also classified by considering the type of relationship among researchers like student-teacher, assistant-director, researcher-technician, peer-to-peer, and so on (Garfield et al., 2000). A significant proportion of these researches occur mainly in terms of thesis, dissertations, project reports, survey reports, and research articles.

The researches published in journals have great scope of spreading ideas among the researchers working in the similar areas. Almost 90% research articles published in the journals discuss the current trends/problems of research. Therefore, it is an important problem to analyse the research articles published in the journals with the help of scientometric and bibliometric idicators. The present study is an attempt in the direction of analysis of pattern of collaboration in the research articles published in journals. For the present study the journal: Annals of Library and Information Studies is selected for the analysis of various indicators of collaboration and pattern of collaboration. The study is confined of the period 2011-2015. A significant correlation exists between the journals available to the researchers and research productivity of the researchers/institution. The purpose of the present study is to determine the rate of publications between single and multiple authors and institutional collaboration and collaborative research trends in the selected journals of library and information science.The trend of research and authorship pattern occurred in any branch of research can be understand by using suitable methods of Scientometric. The term Scientometric is coined by Nalimov and Mulchenko (1969). It is a branch of science which mainly deals with quantitative aspect of research among various types of publications. A number of studies have been carried out to understand trend of collaboration which reveals that collaboration effects positively to the research productivity and also it is cost effective with respect to global economy.According to *Online Dictionary of Library and Information Science* (ODLIS) "authorship pattern is an important bibliometric measure reflecting contemporary communication patterns, productivity and collaboration among the researchers". The study of authorship pattern is one of the prime aspects of citation analysis. Collaborative research and authorship trend are important in the study of informetrics and bibliometrics.

Literature Review

Some of the notable studies in this field are: Elango (2017) has analyzed the bibliometric properties of the articles published during the period 2006- 2015 in the journal *Nature Nanotechnology.While* Chaman (2016) has performed his study to analyze research contribution from Department of Library and Information Science, University of Karnataka based on Ph.D. theses available at Soudhganga-INFLIBNET. Machado, Fanjul, and Madrid (2015) have performed bibliometric study to compute the values of collaboration index as well as degree of collaboration for the journals indexed in American Journals of Information Science & Library Science in Journal Citation Report. Shivcharan and Sandeep (2015) have studies the authorship trends and pattern of collaborative research in the field of library and information science for the data collected from Emerald database Library Hi–Tech e-Journal published during the 2005-2015. Thavamani (2015) has presented bibliometric study to analyze the pattern of collaboration for 223 research papers produced by 343 researchers. The average authors per paper, highest authors productivity, and degree of collaboration were computed as 1.538, 0.65, and 0.354 respectively. Rajgoli and Laxminarsaiah (2015) had studied about 1,907 articles published during 2001- 2011 in 154 volumes for three different journals. About 4,355 authors have contributed their research in 1,907 articles. The degree of collaboration was 0.90. They have tested applicability of Lotka's law of scientific productivity and found that the law holds only partially for the collected data.

Siamaki, Geraei and Farashbandi (2014) have showed the number of individual articles has decreased while the number of collaborative articles has increased. Although, about 53.72% researchers have used individual pattern for their works and 36.20% of the researchers collaborated with only one other individual. Thavamani (2014)has presented his study to analyze the pattern of collaboration for the research articles published in the journal: *Chinese Librarianship: an International Electronic Journal* during 1996-2013. He has investigated authorship pattern, and computed the degree of collaboration, and author's productivity. About 133 research articles have been contributed by 221 researchers. The degree of collaboration, average number of contributors per paper, and average author's productivity

per paper were computed as 0.443, 1.661, and 0.601 respectively. Ezema and Asogwa (2014) have investigated the references cited in the research papers published in two linguistic journals. They have observed that the degree of collaboration for these journals is very low.

Rani and Nagaraju (2013)have analyzed the scholarly communications published in 26 issues of 9 volumes of the journal *Webology* during 2004- 2012. About 32 (31.68%) papers were contributed by collaboration of two authors, and 12 (11.88%) papers by three authors. The degree of collaboration is 0.45. They have noted that India has contributed largest number of (15.84%) articles. Rattan (2013) has analysed the acknowledgement provided by the authors in their research articles published in the journal *Annals of Library and Information Studies* during 1999-2012. He observed that about 20% of articles have acknowledgements therein, whereas mean acknowledgement per article was 1.49. Velmurugan (2013) has presented a bibliometric study by investigating203 articles appeared in Annals of Library and Information Studies between 2007-2012. About 88 papers were contributed by double authors. The average author per paper and the average productivity per author were 1.87, and 0.53 respectively. The degree of collaboration ranged from 057-0.82, and average degree of collaboration was 0.64. Fry and et al. (2013) have presented their study to analyze the origin of researches published in the *International journal of Production Research* (IJPR) during 1985- 2010. They have suggested that the international journals must publish research papers from international constituency, which is an important purpose of the research.

Source Journal: Malaysian Journal of Library and Information Science (MJLIS)

The Malaysian Journal of Library and Information Science (MJLIS) is reputed journal in the field of library and information science. MJLIS has been started in the year 2009. The publication frequency of the journal is three in a calendar year, i.e., in the month of April, August, and December of every year. The journal LPP is published by University of Malaya. The publication of the journal is under faculty of Computer Science and Information Technology of the university. It publishes original research papers from library science and related areas. The journal LPP has its indexing in number of agencies including Social Science Citation Index, SCOPUS, LISTA, JCR, LISA (Library and Information Science Abstracts), Journal of Academic Librarianship, and Library Literature. During the period from 1996 to 2008, it was published in both forms: electronic as well as print form, but after 2008 onwards it has been published electronically only. The ISSN of the journal LPP for online version is 1394-6234. According to JCR-2015, the impact factor of the journal is 0.476, and it has been ranked 62 among 86 journals published in the area of library science, and information science. Based on SJR-2015, the impact factor of the journal is 0.361, and it has been ranked 88 among 193 journals published in the area of library and information sciences. For more detail about the journal MJLIS, we refer to http://ejum.fsktm.um.edu.my/BrowseJournal.aspx

Objectives

The present study has been carried out to achieve the following objectives:

(i) To examine the pattern of author collaboration for the articles published in MJLS.
(ii) To determine the measures of collaboration: collaboration index (CI), collaboration coefficient (CC), MCC and degree of collaboration (DC) on the data under study;
(iii) To find out the most prolific authors and most productive organizations/institutions in the field of LIS;
(iv) To examine the trend of Intra Institute and Intermediate collaboration in LIS;
(v) To analyse keywords and subject/discipline of research for the data under study.
(vi) To test the applicability of Lotka's law and Zipf's law for the data under syudy.

Methodology

The literature survey is most important part of the research. The systematic and sufficient survey on published documents in the area of research removes uncertainty and helps in framing the research problem. It plays a very important role in research activities as it forms the very first step of research pursuit and brings visibility.The data is downloaded from the websites of the respective journals in the form of research articles for five years during the period from 2011 to 2015 and analyzed by using suitable tools and techniques.

Measures of Collaboration: The collected data is investigated by using suitable mathematical formulae as discussed in the following.

1 Degree of Collaboration (DC): For computation of degree of collaboration (DC), Subramanyam have provided the following mathematical formula.

$$DC = \frac{N_m}{N_m + N_s},$$

where,Nm= Number of multi-authored articles and Ns= Number of single authored articles.

2 CollaborationIndex (CI): The concept of collaboration index is provided by Lawani (Lawani, 1980). For calculating CI, single authored papers are omitted as it equals to 1 always.

$$CI = \frac{Totalauthors}{Totaljointpapers}$$

3 CollaborationCoefficient (CC): The concept of collaboration coefficient (CC) is provided by Ajiferuke et al. (1988).

$$\boldsymbol{CC = 1 - \frac{\sum_{j=1}^{A}\left(1/j\right)f_i}{N}}$$

4 Modified Collaborative Coefficient (MCC): The formula for calculation of MCC is given by Sarvanur and Srikanth (2010). The mathematical expression for MCC is given as follows:

$$\boldsymbol{\kappa = \frac{A}{A-1}\left\{1 - \frac{\sum_{j=1}^{A}\left(1/j\right)f_i}{N}\right\}}$$

5 Average Authors Per Paper (AAPP): The average authors per paper are defined as proportion of total number of authors to total number of papers.

$$\text{Average Authors per Paper} = \frac{\text{Total No.of Authors}}{\text{Total No.of Papers}}$$

6 Productivity Per Author (PPA): Productivity per author is defined as number of papers belongs to individual author in a given time period.

$$\text{Productivity per author} = \frac{\text{Total No.of Papers}}{\text{Total No.of Authors}}$$

7 Lotka's Law: Lotka's Law provides the frequency of the publications by the researchers in a given field and defined by the formula:

$$Y = \frac{C}{X^n}$$

where, *Y* = the number of researchers credited with *X* (1, 2, 3, 4……) papers

C = the number of authors contributing single paper.

n = rate (usually *n* = 2, 3 etc.)

8 Zipf's law: The Zipf's law provides a relationship between frequency of occurrence of the event and its rank.

$$f(k; s, N) = \frac{1/k^s}{\sum_{n=1}^{N} 1/n^s}$$

9. Co-authorship Index (CAI):

CAIis obtained by calculating proportional outputof single, two, multi and mega-authored papers developed Garg and Padhi.

CAI = (Nij/Nio)/(Noj/Noo) *100

Where

Nij = Number of publications having j author for a particular block

Nio = Total output for the particular block

Noj = Number of papers having j authors for all blocks

Noo = Total number of papers for all authors and all blocks

Results and Discussion

Malaysian Journal of Library and Information Science is an established journal in the field of library and information science. A total of 110 research articles are published by 289 authors in the journal MJLIS from period 2011 to 2015. The collected data is analyzed and interpreted with help of tables, graphs, and bar diagrams. We have computed DC, CI, CC, MCC, AAPP, PPA, list of most prolific authors, most prolific institutes, most prolific country, and list of keywords. Further, we have tested applicability of Lotka's law and Zipf's law on the data under study.

1 Distribution of Articles

Year	***Number of articles***	***Percentage %***
2011	*28*	*25.45*
2012	*20*	*18.18*
2013	*22*	*20*
2014	*20*	*18.18*
2015	*20*	*18.18*
Total	*110*	

Table .1: Distribution of articles of MJLIS

The above table shows year wise distribution of articles in Malaysian journal of Library and Information Science. Total number of 110 articles has been contributed by authors in five years. Number of

publication 28 (25.45%) are in the year 2011, whereas 20 (18.18%) articles in 2012, 22 (20 %) articles in 2013, 20 (20.23%) articles in the year 2014 and 2015 each.

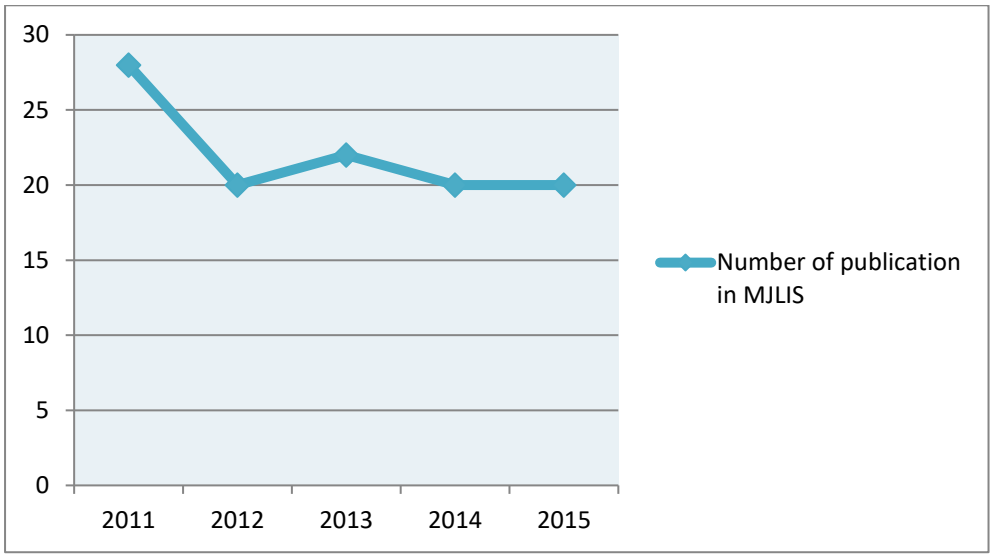

Figure 1: Distribution of articles of MJLIS

2 Distribution of Authors

Year	***Number of authors***	***Percentage***
2011	*72*	*24.91*
2012	*58*	*20.06*
2013	*58*	*20.06*
2014	*45*	*15.57*
2015	*56*	*19.37*
Total	*289*	

Table 2: Distribution of authors in MJLIS

The above table presents data about year wise distribution of authors in MJLIS. About 289 authors have contributed their research articles during the period 2011-2015. It is observed that maximum number of 72 (24.91%) authors have contributed in the year 2011 whereas the year 2014 has minimum number of 45(15.57%) authors. The data shows a sharp decline in number of articles over five years. Further, year 2012 and 2013 have 58 (20.06%) articles, and the year 2015 has 56 (19.37%) authors.

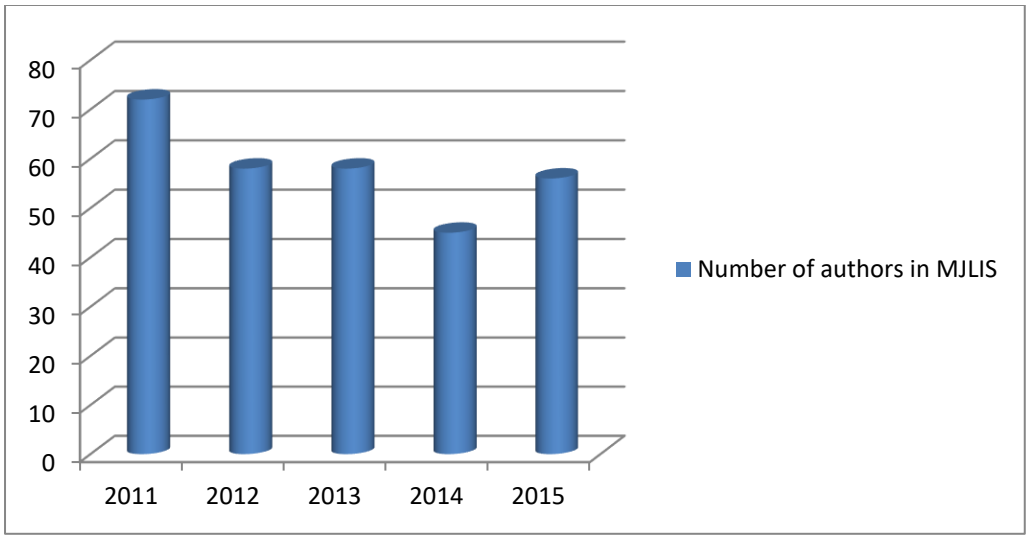

Figure 2: Distribution of Authors in MJLIS

3 Authorship Pattern

	Single author	*Double author*	*Triple authors*	*Four authors*	*Five authors*	*More than five authors*	*Degree of Collaboration (DC)*	*Collaboration Index (CI)*	*Collaboration Co-efficient (CC)*	*Modified Collaboration Co-efficient (MCC)*
2011	*3*	*15*	*5*	*3*	*1*	*1*	*0.89*	*2.57*	*0.51*	*0.52*
2012	*6*	*3*	*7*	*2*	*0*	*2*	*0.70*	*2.90*	*0.22*	*0.22*
2013	*3*	*9*	*7*	*1*	*1*	*1*	*0.86*	*2.80*	*0.51*	*0.52*
2014	*4*	*8*	*7*	*1*	*0*	*0*	*0.80*	*2.25*	*0.48*	*0.49*
2015	*2*	*7*	*7*	*2*	*1*	*1*	*0.90*	*2.85*	*0.57*	*0.58*
Total	*18*	*42*	*33*	*9*	*3*	*5*				

Table 6.3: Authorship Pattern, DC, CI and CC and MCC of MJLIS

The above table presents authorship pattern in the journal MJLIS. It gives distribution of number of authors over the years from 2011-2015. During the five years, 2011 have maximum number of 15 double authored articles whereas minimum number of articles is 3 during the year 2012. In these five years it is observed that single authored papers are less in comparison to multiple authored papers. We have noted that there are total 18 single authored papers, 42 double authored papers, 33 triple authored papers 9 four authored paper, 3 five authored papers and 5 papers are written by more than 5 authors. Further, we have computed DC which lies from 0.70 to 0.90. Furthermore, the maximum value of CI is 2.90 for the year 2012 whereas minimum value is 2.25 for the year 2014. The maximum values of both CC and MCC are 0.57 and 0.58 respectively for 2015, and minimum value is 0.22 for the year 2012.

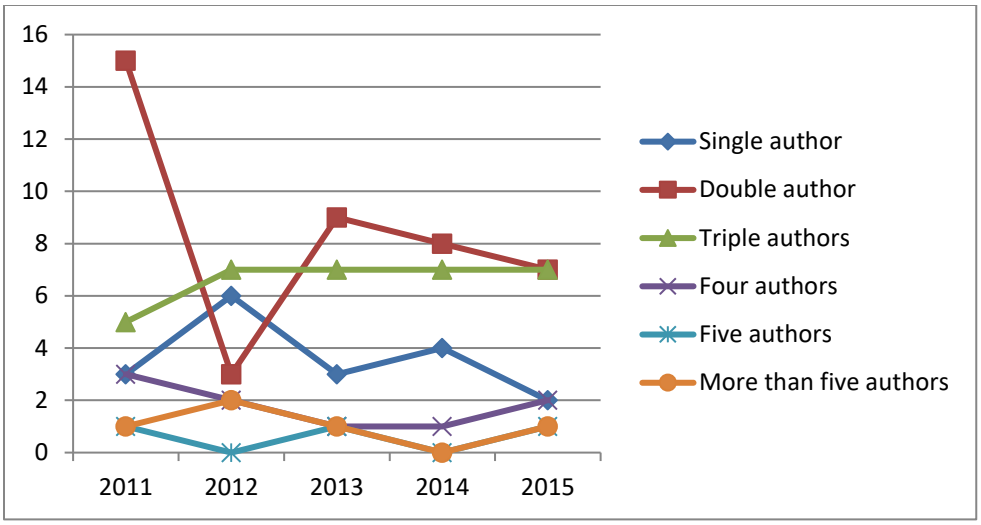

Figure 3 (A): Authorship pattern of MJLIS

The above chart shows the authorship pattern of authors. The chart is showing in detail the number of single and multiple authors in five years period from 2011 – 2015. Papers written by more than five authors are higher as compared to single or double authored papers. This shows that nowadays researcher prefer collaborative researches as compared to sole authorship.

3 (B): DC, CI, CC and MCC of MJLIS

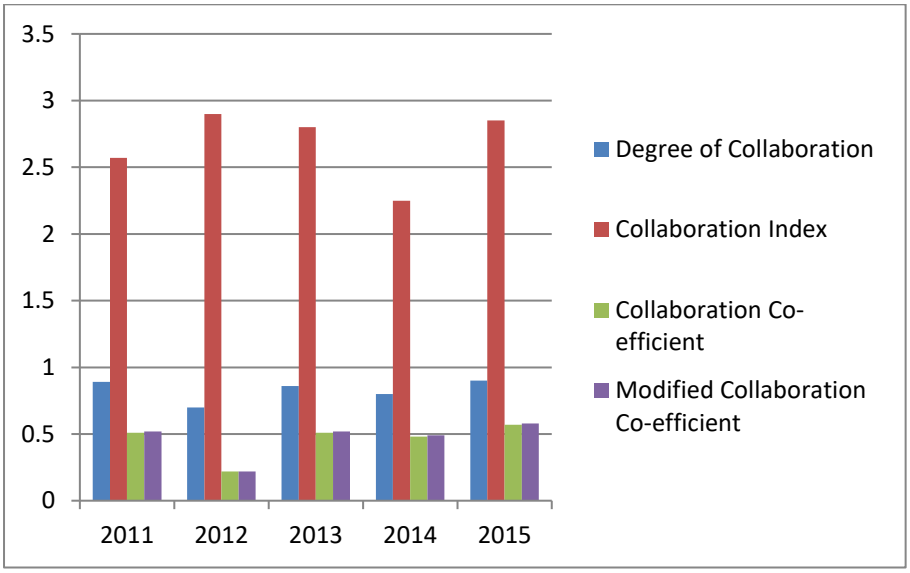

Figure 3 (B): DC, CI, CC and MCC of MJLIS

The above figure presents the comparative analysis of the indicators DC, CI, CC, and MCC for the journal MJLIS during the five years.

Table 4: Co-Authorship Index (CAI)

	Single Author		*Double Author*		*Three Author*		*Four Author*		*< Four Author*		*Total*
Year	*Articles*	*CAI*	*Articles*	*CAI*	*Articles*	*CAI*	*Articles*	*CAI*	*Articles*	*CAI*	
2011	*3*	*65*	*15*	*140*	*5*	*60*	*3*	*131*	*2*	*98*	*28*
2012	*6*	*183*	*3*	*39*	*7*	*117*	*2*	*122*	*2*	*138*	*20*
2013	*3*	*83*	*9*	*107*	*7*	*106*	*1*	*56*	*2*	*125*	*22*
2014	*4*	*122*	*8*	*105*	*7*	*117*	*1*	*61*	*0*	*0*	*20*
2015	*2*	*61*	*7*	*92*	*7*	*117*	*2*	*122*	*2*	*138*	*20*
Total	***18***	***102.8***	***42***	***96.6***	***33***	***103.4***	***9***	***98.4***	***8***	***99.8***	***110***

Table 4 indicates the calculated values of Co-authorship Index (CAI) for publications under study. CAI measures the tendency of co-authorship and was proposed by Garg and Padhi. CAI = 100 indicates that the co-authorship effort for a particular type of authorship corresponds to the overall average, CAI > 100 reflects higher than average co-authorship effort and CAI < 100 shows lower than average co-authorship effort for a given type of authorship pattern. From above table we can observe that the value of CAI for single and double authors show no consistent trend but overall in decreasing order, which means there is a substantial decrease in the single and double authorship with respect to overall output. CAI was For three co-authors, it was below average in the last year 2018 while in 2009, 2010 and 2017 it was pretty well above average. In case of single, triple and more than four authorship, the CAI is <100 (102.3, 103.4, and 99.8 which means collaboration tendency is high among authors. Highest collaborative effort has been observed among the three authors (103.4).

5. AAPP and PPA

Year	***Total no. of papers***	***Total no. of authors***	***Average Authors Per Paper (AAPP)***	***Productivity per Author (PPA)***
2011	*28*	*72*	*2.57*	*0.38*
2012	*20*	*58*	*2.9*	*0.34*
2013	*22*	*58*	*2.63*	*0.37*
2014	*20*	*45*	*2.25*	*0.44*
2015	*20*	*56*	*2.80*	*0.35*
Total	*110*	*289*		

Table 5: AAPP and PPA

In the above table, we have calculated average authors per paper (AAPP) and productivity per author (PPA) by using formulae given in chapter 1. It is observed that value of AAPP is greater than 1 and PPA is less than 1 for all five years. In the year 2012, the maximum value of AAPP is 2.9 whereas minimum value of PPA is observed as 0.34 for the same year. So, we can say that maximum value of AAPP corresponds to the minimum value of PPA. This means that when AAPP increases, PPA decreases. Again

the minimum value of AAPP is 2.25 and maximum value of PPA is 0.44 in the same year 2014, which declares that AAPP is inversely proportional to PPA for the given data.

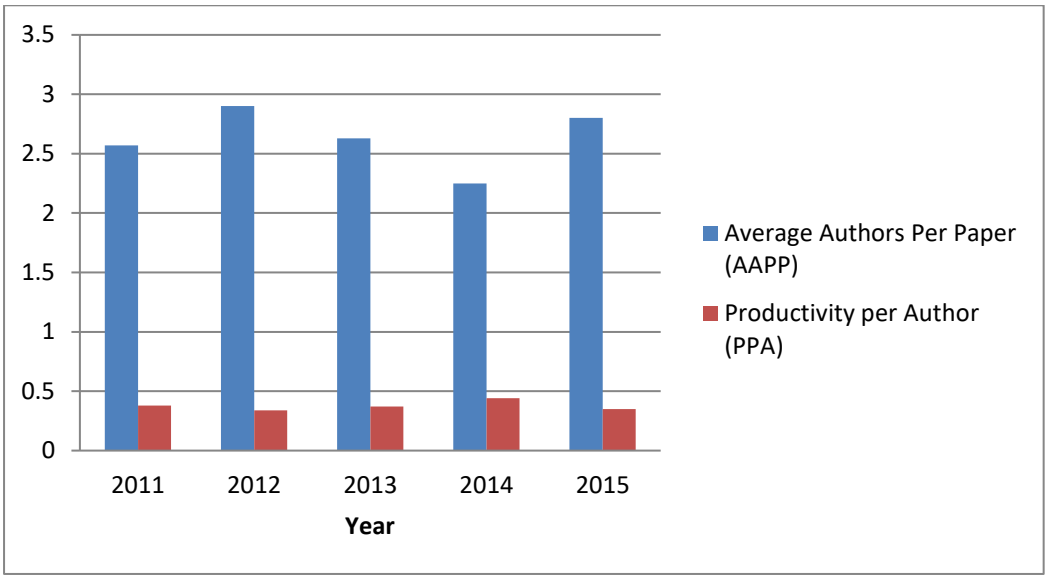

Figure 5: AAPP and PPA of MJLIS

The above chart shows the comparative bar graph showing Average Authors per Paper (AAPP) and Productivity per Author (PPA) of MJLIS journal over five years.

6 Most Prolific Authors

S. No.	*Name of Authors*	*Frequency*	*Percentage %*	*Rank*
1	*A. Abrizah*	*10*	*3.46*	*1*
2	*A.N. Zainab*	*9*	*3.11*	*2*
3	*Noor Harun Abdul Karim*	*5*	*1.73*	*3*
4	*S.A. Sanni*	*5*	*1.73*	*3*
5	*Ronald Rousseau*	*4*	*1.38*	*4*
6	*A. Noorhidawati*	*3*	*1.03*	*5*
7	*Brendan Luyt*	*3*	*1.03*	*5*
8	*Fred Y. Ye*	*3*	*1.03*	*5*
9	*L. Egghe*	*3*	*1.03*	*5*
10	*Mohammadamin Erfanmanesh*	*3*	*1.03*	*5*
11	*B. S. Kademani*	*2*	*0.69*	*6*
12	*Chatree Wongkaew*	*2*	*0.69*	*6*
13	*Dalibor Fiala*	*2*	*0.69*	*6*
14	*Dar-Zen Chen*	*2*	*0.69*	*6*
15	*H. Safahieh*	*2*	*0.69*	*6*

16	*K. Bhanumurthy*	*2*	*0.69*	*6*
17	*K. Kiran*	*2*	*0.69*	*6*
18	*Kanwal Ameen*	*2*	*0.69*	*6*
19	*Mahmood Khosrowjerdi*	*2*	*0.69*	*6*
20	*Maizatul Akmar Ismail*	*2*	*0.69*	*6*
220	*Shiau Rahimi*	*1*	*0.34*	*7*
	Total	*289*		

Table 6: Most prolific authors

The above table shows the list of prolific authors with their ranking according to their frequency of occurrence. The most prolific author of MJLIS Journal is A. Abrizah, who has contributed 10 research articles from 110 articles in the journal and is ranked 1st in most prolific authors list. 2nd rank is obtained by the author A.N. Zainab who has contributed 9 research articles. Each of the authors namely Noor Harun Abdul Karim and S.A. Sanni has contributed 5 papers and are placed on 3rd rank. Authors are arranged according to their number of research articles contributed to MJLIS.

7 Lotka's Law

S. No.	*No. of authors*	*No. of publication*	*No. of authors (n = 2)*	*No. of authors (n = 2.64)*
1	*181*	*1*	*181*	*181*
2	*29*	*2*	*45.25*	*29.05*
3	*5*	*3*	*20.11*	*9.95*
4	*1*	*4*	*11.31*	*4.65*
5	*1*	*9*	*2.23*	*0.54*
6	*1*	*10*	*1.81*	*0.41*
Total	*218*			

Table 7: Lotka's Law

The above table presents the applicability of Lotka's Law. By taking different value of *n* we have tested whether the journal follows the law or not. We have taken two different values *n* = 2 and *n* = 3 for employing the test. It is observed that the journal MJLIS follows Lotka's Law slightly for the value of n = 3.

8 Ranking of Keywords

S. No.	*Keywords*	*Frequency*	*Percentage %*	*Rank*
1	*Bibliometrics*	*43*	*18.85*	*1*
2	*Information literacy*	*11*	*4.82*	*2*
3	*Library use*	*12*	*4.82*	*3*
4	*Information seeking*	*10*	*4.38*	*4*
5	*Malaysia*	*8*	*3.50*	*5*
6	*Research*	*6*	*2.63*	*6*
7	*Academic libraries*	*4*	*1.75*	*7*
8	*Management*	*4*	*1.75*	*7*
9	*Resource sharing*	*4*	*1.75*	*7*

10	*User education*	*4*	*1.75*	*7*
11	*Digital repositories*	*3*	*1.31*	*8*
12	*Personal information management*	*2*	*1.31*	*9*
13	*Cataloguing*	*2*	*0.87*	*9*
14	*Copyright*	*2*	*0.87*	*9*
15	*Country*	*2*	*0.87*	*9*
16	*Customer satisfaction*	*2*	*0.87*	*9*
17	*E-Learning*	*2*	*0.87*	*9*
18	*Knowledge management*	*2*	*0.87*	*9*
19	*Libraries*	*2*	*0.87*	*9*
20	*Library Users*	*2*	*0.87*	*9*
	Total No. of Keywords	***228***		

Table 8: Most Prolific Keywords

In the above table Keywords are arranged according to the frequency of its occurrence. The keyword *Malaysia* has occurred 8 times and got ranked 1st, and *Bibliometrics,* and *Information literacy* have occurred 5 times so they are given rank 2nd. Similarly, *Information behavior* and *Scientometrics* have frequency of 4 and provided rank 3rd. Other keywords are arranged according to its frequency.

9 Zipf's Law of Word Occurrence

S.No.	***Keywords***	***Frequency***	***Rank***	***Log (f)***	***Log (r)***	***Log (c)***
1	*Bibliometrics*	*43*	*1*	*1.63*	*0*	*1.63*
2	*Information literacy*	*11*	*2*	*1.04*	*0.30*	*1.34*
3	*Library use*	*12*	*3*	*1.07*	*0.47*	*1.54*
4	*Information seeking*	*10*	*4*	*1*	*0.60*	*1.6*
5	*Malaysia*	*8*	*5*	*0.90*	*0.69*	*1.59*
6	*Research*	*6*	*6*	*0.77*	*0.77*	*1.54*
7	*Academic libraries*	*4*	*7*	*0.60*	*0.84*	*1.44*
8	*Digital repositories*	*3*	*8*	*0.47*	*0.90*	*1.37*
9	*Web 2.0*	*2*	*9*	*0.30*	*0.95*	*1.25*
10	*Academic anxieties*	*1*	*10*	*0*	*1*	*1*

Table 9: Zipf's Law of Word Occurrence

From the above table it is shows that the Zipf's law not holds for the journal MJLIS.

10 Ranking of Institutes

S.No.	*Name of Institute/ Organization*	*Frequency*	*Rank*	*Country*
1	University of Malaya, Malaysia	60	1	Malaysia
2	Nanyang Technological University, Singapore	17	2	Singapore
3	Islamic Azad University, Iran	13	3	Iran
4	Universiti Sains Malaysia	12	4	Malaysia
5	Institute of Scientific and Technical Information of China, Beijing, China	8	5	China
6	Thai Journal Citation Index (TCI) Centre, Thailand	8	5	Thailand
7	King Mongkut's University of Technology, Thailand	7	6	Thailand
8	Kuwait University, Kuwait	7	6	Kuwait
9	KU Leuven, Belgium	5	7	Belgium
10	University of Punjab, Lahore, Pakistan	5	7	Pakistan
11	Antwerp University Belgium	4	8	Belgium
12	Iranian Research Institute for Information Science & Technology , Tehran, Iran	4	8	Iran
13	Ministry of Education Malaysia, Putrajaya, Malaysia	4	8	Malaysia
14	National Taiwan University, Taipei, Taiwan	4	8	Taiwan
15	Zhejiang University, China	4	9	China
16	Jiangsu University, China	3	9	China
17	KHBO, Faculty of Engineering Technology, Belgium	3	9	Belgium
18	Khon Kaen University, Thailand	3	9	Thailand
19	Nanjing Agricultural University, China	3	9	China
20	Nanjing University, China	3	9	China

Table 10: Ranking of Institutes

The above table presents name of institutes from where authors are affiliated. A total of 97 institutes are listed. The most prolific institute during the period 2011-2015 is *University of Malaya*, *Malaysia*. Out of 289 institutes *University of Malaya*, *Malaysia* has published 60 research articles during the five years. We have provided rank to each institute involved in the list of author's affiliation.

11 Ranking of Countries

S. No.	*Country*	*Frequency*	*Percentage %*	*Rank*
1	*Malaysia*	*87*	*30.10*	*1*
2	*Jordan*	*35*	*12.11*	*2*
3	*China*	*31*	*10.27*	*3*
4	*Singapore*	*24*	*8.30*	*4*
5	*Taiwan*	*23*	*7.95*	*5*
6	*Belgium*	*19*	*6.57*	*6*

7	*Thailand*	*19*	*6.57*	*6*
8	*India*	*9*	*3.11*	*7*
9	*Kuwait*	*8*	*2.76*	*8*
10	*Pakistan*	*8*	*2.76*	*8*
11	*Nigeria*	*7*	*2.42*	*9*
12	*Iran*	*3*	*1.03*	*10*
13	*UK*	*3*	*1.03*	*10*
14	*Czech Republic*	*2*	*0.69*	*11*
15	*South Korea*	*2*	*0.69*	*11*
16	*USA*	*2*	*0.69*	*11*
17	*Germany*	*1*	*0.34*	*12*
18	*Korea*	*1*	*0.34*	*12*
19	*Poland*	*1*	*0.34*	*12*
20	*Republic of Benin*	*1*	*0.34*	*12*
21	*Romania*	*1*	*0.34*	*12*
22	*Spain*	*1*	*0.34*	*12*
23	*UAE*	*1*	*0.34*	*12*
	Total	*289*		

Table 11: Ranking of countries

The above table presents list of countries from where authors belongs. The most prolific country is Malaysia. We have calculated percentage of contribution of each country in terms of publications. Out of total 289 authors involved in publications from various countries, 87 (30.10%) are from *Malaysia*. In this series *Jordan* is placed at second position with rank 2nd for 35 (12.11%) authors contributed in the given period of time.

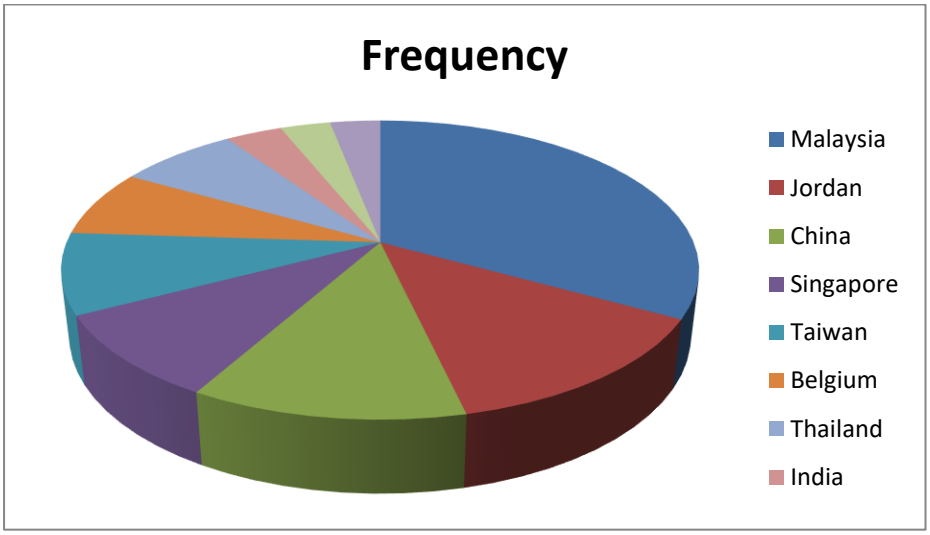

Figure 10: Ranking of countries

11 Types of Collaboration

Year	*Intra institute collaboration*	*Inter institute collaboration*	*International collaboration*
2011	*11*	*9*	*6*
2012	*5*	*8*	*1*
2013	*4*	*11*	*5*
2014	*7*	*7*	*4*
2015	*7*	*3*	*9*
Total	*34*	*38*	*25*

Table 11: Types of Collaboration

In the above table, we have classified types of collaboration. The above table shows number of intra-institute collaboration, inter-institute collaboration and international collaboration over five years. Inter-institute collaboration is observed maximum as compared to intra-institute collaboration and international collaboration over all five years. It was analysed that there are 38 inter-institute collaborations, 34 are intra institute collaborations and 25 international collaborations.

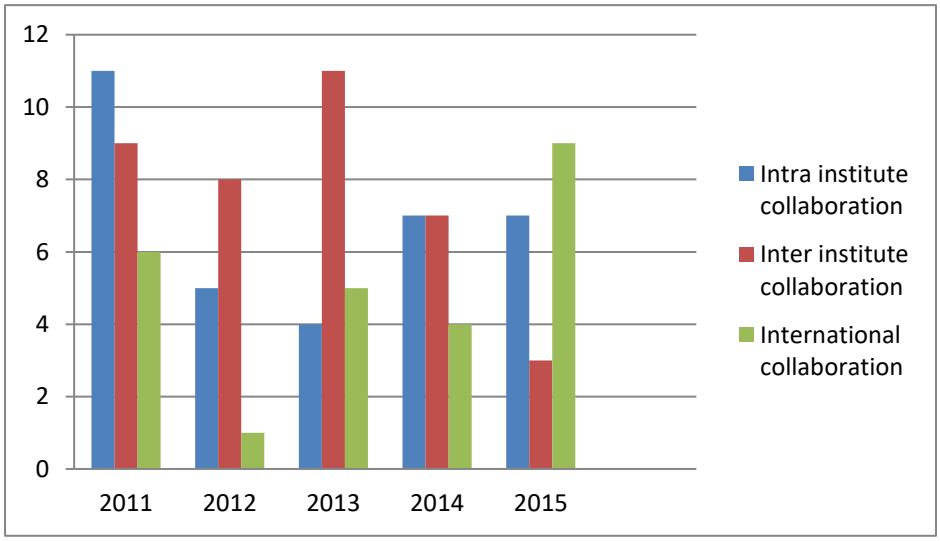

Figure 12: Types of Collaboration

13 International Institutes

S. No.	*Name of Institute/ Organization*
1	*Adan Hospital, Ministry of Health, Kuwait*
2	*Antwerp University Belgium*
3	*Bandar BaruNilai, Malaysia*
4	*Bayero University Kano, Nigeria*
5	*Blk 32 Marine Crescent, Singapore*

6	*Bureau d'Etudes et de Recherches en Science de l'information , Republic of Benin*
7	*China Jiliang University, China*
8	*China University of Technology, Taiwan*
9	*CIBER Research Ltd, UK*
10	*Division for Science and Innovation Studies, Germany*
11	*Guei Ren Junior-High School, Taiwan*
12	*Harbin Institute of Technology, China*
13	*Imperial College London, London, U.K.*
14	*Indiana University, Bloomington, USA*
15	*Institute of Scientific and Technical Information of China, Beijing, China*
16	*International Islamic University Malaysia, Malaysia*
17	*Iranian Research Institute for Information Science & Technology , Tehran, Iran*
18	*Islamic Azad University, Iran*
19	*Islamic Science University, Malaysia*
20	*Jagiellonian University, Poland*
21	*Jiangsu University, China*

Table 13 International Institutes

The above table presents the list of all international institutes who have been involved in carrying out research and have got published their articles in MJLIS during year 2011-2015. It is found that a total of 88 international institutes have published their research work in the journal MJLIS during the period of study.

14: Distribution of Subjects

S. No.	***Subjects***	***Frequency***	***%***	***Rank***
1	*Bibliometrics, Scientometrics, informetrics*	*62*		*1*
2	*Other management procedures and operations*	*22*		*2*
3	*Country, State, district*	*19*		*3*
4	*Library use and users*	*10*		*4*
5	*LIS- education and training*	*8*		*5*
6	*Research*	*7*		*6*
7	*Web 2.0*	*7*		*6*
8	*Periodicals and newspapers*	*5*		*7*

9	*Cataloguing and indexing*	*5*		*7*
10	*Motivation*	*5*		*7*
11	*Information work*	*4*		*8*
12	*Information storage and retrieval – searching*	*4*		*8*
13	*Communication and information technology*	*4*		*8*
14	*Copyright*	*4*		*8*
15	*Academic libraries (not school libraries)*	*4*		*8*
16	*User training*	*4*		*8*
17	*Libraries and resource centers*	*4*		*8*
18	*Information communication*	*3*		*9*
19	*Digital repositories*	*3*		*9*
20	*Databases in general*	*3*		*9*
	Total	*228*		

Table 14: Distribution of subjects

The above table shows the distribution of subjects of the published articles in the journal MJLIS over five years. It is found that maximum number of 62 research articles is published in the area of the subject "*Bibliometrics, Scientometrics, and Informetrics*" and hence got ranked 1st.

Major Findings

The major findings and results obtained on the basis of data analysis and computation are as follows:

1. During the period of study MJLIS has published 110 articles by 289 authors. The number of articles during the years 2011 to 2015 is 28, 20, 22, 20, 20 arranged in chronological order. The year wise distributions of authors during 2011-2015 are 72, 58, 55, 45 and 56.
2. During the period of study 18 single authored, 42 double authored, 33 triple authored, 3 five authored 9 four authored and 5 more than 5 authored papers have been contributed.
3. The average degree of collaboration is 0.83, average collaboration index is 2.67, average coefficient of collaboration is 0.51, and average modified collaboration coefficient is 0.53 during the five years 2011-2015.
4. The first three most prolific institutes for MJLIS are as follows. University of Malasia, Nanyang Technological University, Singapore (17), Islamic Azad University, Iran (13), Universiti Sains Malaysia (12).
5. The first three most productive countries are: Malasia (87), Jordan (35), Chaina (31), Singapore (24) and Taiwan (23).
6. The three most prolific author of MJLIS Journal is A. Abrizah, who has contributed 10 research articles, A.N. Zainab who has contributed 9 research articles. Noor Harun Abdul Karim and S.A. Sanni has contributed 5 papers and are placed on 3rd rank.
7. Bibliometrics, information literacy, Library use, Information Seeking Behaviour and Malaysia are the most used keywords.
8. Average authors per paper (AAPP) during the five years are 2.57, 2.9, 2.63, 2.25, and 2.80. The productivity per author (PPA) during the five years are 0.38, 0.34, 0.37, 0.44, and 0.35.
9. It was analysed that there are 38 inter-institute collaborations, 34 are intra institute collaborations and 25 international collaborations. It is found that a total of 88 international institutes have published their research work in the journal MJLIS during the period of study.

Conclusion

The primary aim of the present study is to investigate the pattern of collaboration and authorship pattern for the publications appeared in the journal Annals of Library and Information Studies. In the current era of increasing global communication, the collaborative research and multiple authorships has got established through various bibliometric and scientometric studies. The present study shows that number of two authored articles is more than single authored articles. The degree of collaboration is high which declares the interdisciplinary nature of the research and a common interest of researchers in a particular field of research. During the period of study the most prolific instituteis *CSIR National Institute of Science Communication and Information Resources, New Delhi, India.* For the journal ALIS, India has contributed largest number of articles followed by Nigeria. The state wise analysis shows that Delhi is on the top of the list in terms of highest number of publications whereas West Bengal remains at second position. As an individual contribution the most prolific author is *B. K. Sen* followed by *Bidyarthi Dutta.*

The available literature shows the importance of the studies related to the investigation of pattern of collaboration and authorship pattern. The results of the present study will be useful to understand the productivity measure, trend of collaboration, performance of the researchers, and collaboration tendency of institutions. Although the study has been conducted for only for five years data, but a mild solution can be drawn from the obtained results. The data presented here and the results may be useful for several government/private agencies for various purposes related to bibliometric and scientometric investigations.

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